

Clinical Section

Observations on the Incidence and Epidemiology of Tuberculosis\*

By

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Tuberculosis can be traced farther back into history than any known infection; as a separate disease it was identified before all others. Recognisable accounts are found in Babylonian, Egyptian, and Grecian literature. These accounts are confirmed by palaeopathology; there is a well known specimen showing advanced Potts' disease in a mummie said to have been buried several thousand years B.C.

The incidence of the tuberculosis in the pre-Christian era is impossible to estimate. In the Hippocratic works phthisis is spoken of as a very common febrile disease. It was known to be infectious and the age incidence was well recognised. Hippocrates says: In the different ages the follow-

\* Part of a symposium on Pulmonary Tuberculosis read before the Winnipeg Medical Society, February 17th, 1939.

ing complaints occur: "To persons past boyhood, haemoptysis, phthisis, acute fevers, epilepsy, and other disease but especially the aforementioned." (Aphorisms III-29). Also he says: "Phthisis most commonly occurs between the ages of 18 and 35 years." (Aphorisms V-9). This age incidence has been confirmed by observers in all periods of history.

Early Figures of Incidence

The first figures of incidence that I have found are those set out in the "Bills of Mortality" for London in the year 1665. These were probably kept because of interest in the Great Plague which was then at its height. Incidentally, it gives us our first statistical account of tuberculosis, the perennial plague that has been the chief scourge of mankind from its infancy. There is an interesting title page attached to this gruesome record. (The Bills of Mortality, 1665). It is artistically decorated with skulls, broken bones, grave-diggers' implements, hour glasses, and other things to remind us of the brevity and insecurity of life. Following this title page is a weekly record of all the deaths in London. In the introduction to what the printer calls "these sad sheets" he states that the devastation of the plague was in evidence of divine displeasure and meant that "Except we speedily and seriously repent we shall all likewise perish either Similitudine or Certitudine Paenae." Reproduced in Table I. is a summary for the year.

TABLE I.  
*The Diseases and Casualties this Year*

|  |      |   |      |   |       |
|--|------|---|------|---|-------|
| Abortive and Stilborne .....   | 617  | Flox and Small-pox .....                | 655  | Overlaid & Starved .....                      | 45    |
| Aged .....   | 1545 | Found dead in streets, fields, &c. .... | 20   | Palsie .....                                  | 30    |
| Ague and Feaver .....  | 5257 | French Pox .....                        | 86   | Plague .....                                  | 68596 |
| Appoplex and Suddenly .....  | 116  | Frighted .....                          | 23   | Plannet .....                                 | 6     |
| Bedrid .....   | 10   | Gout and Sciatica .....                 | 27   | Plurisie .....                                | 15    |
| Blasted .....  | 5    | Grief .....                             | 46   | Poysoned .....                                | 1     |
| Bleeding .....   | 16   | Gripping in the Guts .....              | 1288 | Quinsie .....                                 | 35    |
| Bloody Flux, Scowring & Flux .....   | 185  | Hangd & made away themselves .....      | 7    | Rickets .....                                 | 557   |
| Burnt and Scalded .....  | 8    | Headmouldshot & Mould-fallen .....      | 14   | Rising of the Lights .....                    | 397   |
| Calenture .....  | 3    | Jaundies .....                          | 110  | Rupture .....                                 | 34    |
| Cancer, Gangrene, and Fistula .....  | 56   | Impostume .....                         | 227  | Scurvy .....                                  | 105   |
| Canker, and Thrush .....   | 111  | Kild by severall accidents .....        | 46   | Shingles and Swine pox .....                  | 2     |
| Childbed .....   | 625  | Kings Evill .....                       | 86   | Sores, Ulcers, broken and bruised Limbs ..... | 82    |
| Chrisomes and Infants .....  | 1258 | Leprosie .....                          | 2    | Spleen .....                                  | 14    |
| Cold and Cough .....   | 68   | Lethargy .....                          | 14   | Spotted Feaver and Purples .....              | 1929  |
| Collick and Winde .....  | 134  | Livergrown .....                        | 20   | Stopping of the Stomack .....                 | 332   |
| Consumption and Tissick .....  | 4808 | Meagrom and Headach .....               | 12   | Stone and Strangury .....                     | 98    |
| Convulsion and Mother .....  | 2036 | Meazles .....                           | 7    | Surfet .....                                  | 1251  |
| Distracted .....   | 5    | Murthered and Shot .....                | 9    | Teeth and Worms .....                         | 2614  |
| Dropsie and Timpany .....  | 1478 |   |      | Vomiting .....                                | 51    |
| Drowned .....  | 50   |   |      | VVenn .....                                   | 1     |
| Executed .....   | 21   |   |      |   |       |
| Christned { Males ..... 5114 }   |      |   |      |   |       |
| { Females .. 4853 }  |      |   |      |   |       |
| { In all ..... 9967 }  |      |   |      |   |       |
| Buried { Males ..... 48569 }   |      |   |      |   |       |
| { Females .. 48737 }   |      |   |      |   |       |
| { In all ..... 97306 }   |      |   |      |   |       |
| Of the Plague ..... 68596  |      |   |      |   |       |
| Increased in the Burials in the 130 Parishes and at the Pest-house this year ..... 79009 |      |   |      |   |       |
| Increased of the Plague in the 130 Parishes and at the Pest-house this year ..... 68590  |      |   |      |   |       |

The devastating effect of the plague is shown. Since London at that time contained something less than half a million people, 68,000 deaths represent a mortality of nearly 15%. It was undoubtedly much higher than that among the lower strata because many of the well to do sought safety in flight. It was called "The Poor Man's Plague." There are several other items of incidental interest in this document. But we are particularly interested in the incidence of tuberculosis. The items here that may be reasonably ascribed to that disease are:

|                                  |       |
|----------------------------------|-------|
| Consumption .....                | 4,808 |
| Kings Evil .....                 | 86    |
| Rising of the Lights .....       | 397   |
| Part of Teething and Worms ..... | 1,300 |
|                                  | —     |
|                                  | 6,591 |

If we include 50% of "Teething and Worms" as tuberculosis we shall not be so far wrong. Certainly in a community riddled with tuberculosis, a very large number of young children must have died of disseminated disease. This gives a total of over 6,000 people having died of tuberculosis. In a population of 500,000 this is a mortality of 1,200 per 100,000 which is appalling. It means that 12% of the people must have been going about with active tuberculosis. It means that the chivalry, romance and glamour in the days of Shakespeare, Elizabeth and Bacon were associated with a tuberculous infestation about three times as bad as we find now among our untreated Indians. It is hard to understand why everyone did not succumb; but perhaps in that blazing furnace of infection our race was forging the relative immunity which gives us partial protection today.

In further confirmation of the enormous ravages of tuberculosis in the 17th century we read in Sydenham (who was at his prime during the plague), "Indeed, deadly as phthisis is, *killing two-thirds of those who die of chronic diseases*, it has a specific in riding, as truly as ague has in bark, or the venereal disease in mercury."

In Graves Clinical Medicine there is an attempt to estimate the incidence of tuberculosis from the vital statistics for 1841. He states that among 2,000,000 people then in London 7,000 died annually of tuberculosis. This is a death rate of 350 per 100,000 or about one-third of what it had been 200 years before, and six times as great as our Canadian Mortality today.

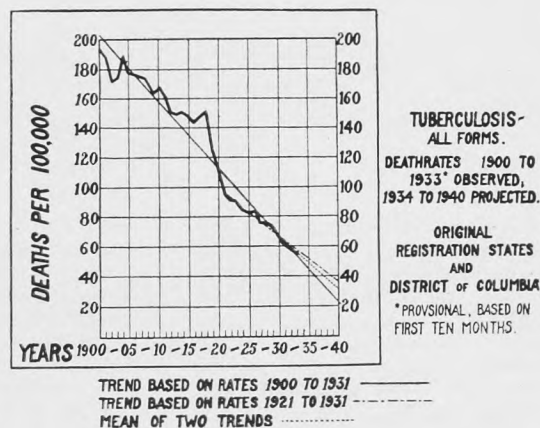
These figures for London of 100 years ago cannot be very accurate. There must have been many errors of omission and of commission in their compilation. But even allowed for much inaccuracy we are forced to the conclusion that Europe has been riddled with tuberculosis as far back as

authentic history can be traced. Even though we have no dependable figures we can make this inference from reading the medical and non-medical literature. The frequency with which people are said to have suffered from, or died with phthisis, consumption, Rising of the Lights, a "bloody flux" from the lungs, dry rot of the lungs, and chronic cough is very striking. In reading the lives of John and William Hunter one feels convinced that this family was heavily infected. There were ten in the family; three died in infancy and four in early adult life. One of these, James, definitely had phthisis and died of haemorrhage. What one can find of the death of the others suggests tuberculosis. This is a typical history of a family with a tuberculous focus in the father or mothers. A certain proportion die of disseminated tuberculosis in babyhood, some die of adult tuberculosis in early maturity, and some survive. The biographical and historical literature contains many similar examples of tuberculous families—something that is almost unknown in well-to-do families of today.

### Modern Statistics

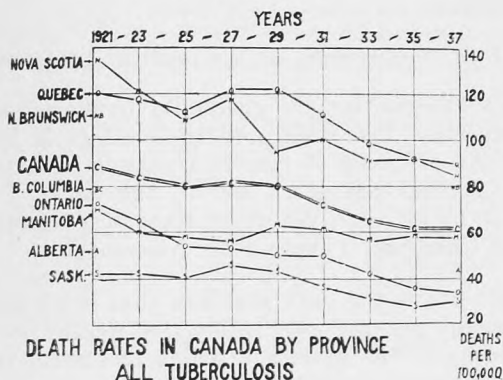
Accurate tuberculosis mortality statistics are not found until the latter part of the 19th century.

GRAPH NO. I.



Graph No. I. shows the death rate from tuberculosis of all forms in the United States from 1900 to 1933. From this you will see a gradual and steady fall of mortality. It starts at 200 in 1900 and drops to nearly 50 in 1934. By projecting this curve by various methods one would predict a death rate from 20 to 30 in 1940. Unfortunately the experience of recent years suggests that a flattening of the curve is taking place and that the ultimate strongholds of tuberculosis will yield only with difficulty. It is interesting to see the sudden fall in death rate in the post war years (1918 to 1922). In Germany a rise in death rate of similar proportion took place at the same time. We shall not speculate upon the causes behind these phenomena.

GRAPH NO. II.



Graph No. II. shows what has taken place in Canada during the past 20 years. The death rate has consistently fallen in each Province. The Provincial death rates tend to decrease as one proceeds West. The only exceptions to this general rule are that Quebec and British Columbia are higher than they should be. In Quebec this may be accounted for by relative crowding and poverty. In British Columbia it may be partly due to the high proportion of Indians in the population and partly to contact with the Orient where tuberculosis is rampant; also, invalids are likely to establish residence on the West coast and finally die there. It will be seen that the death rate in all the Provinces except Manitoba rose definitely in 1926. This was due to the inclusion of Indians in general mortality statistics. In Manitoba, Indians were not included till 1928 and here we see the expected rise. Up to that time Manitoba was running a close race with Ontario but apparently has never recovered. The Indian death rate accounts very largely for our relatively high death rate. Dr. E. L. Ross has recently pointed out that in 1929, 361 white people died of tuberculosis in Manitoba and in 1937 only 257 died—a 28% reduction. In spite of this our gross death rate remains stationary; it is being kept up by the more adequate reporting of Indian deaths; only 63 Indian deaths were reported in 1929 while 176 cases were reported in 1937. This is not due to increasing death rates among Indians. The Indian population is gradually increasing. It is due to increasing interest in tuberculosis among Indians. At present the Indian population which is only 2.2% of the total accounts for 40% of the deaths.

The gradually increasing death rate as one proceeds from the older to the newer provinces have several possible causes:

1. There is less crowding into cities and towns on the prairies. There are few large cities and no slums.
2. The average economic status has, till recently, usually been higher in the West. Poverty is a new experience for us.
3. The population in the pioneer provinces has been automatically selected from the stronger

individuals of the older provinces. The boy with the "weak chest" on the old farm in Bruce county was not the one selected to homestead on the prairies.

4. One may be tempted to think that climate may have something to do with the lower incidence in the drier parts of the Dominion. It is a popular belief that tuberculous people do better in a dry atmosphere. The evidence for and against this idea is complex and not convincing one way or the other.

The general effect of the West on mortality, whatever its cause, is particularly evident in Saskatchewan where the death rate was only slightly over 40 in 1921 and is now 30.

### Decline of Tuberculosis

The figures you have been shown demonstrate the fact that tuberculosis has been on the decline for as long as statistics have been compiled. This applies in all parts of the world. The reason for this decrease is a most interesting epidemiological problem. Of course we have frequently been told that it is due to the anti-tuberculosis effects of doctors, governments and lay bodies, and the advent of Sanatoria with consequent isolation and adequate treatment. The figures that are usually presented to prove this by tuberculosis workers are often not convincing. A graph of the death rate, year by year, over a long period could in most communities be used by the sceptical to prove that our efforts have been futile.

It is obvious that our specific anti-tuberculosis activities have not been the only or perhaps the chief cause for the following reasons:

1. The decline and fall of tuberculosis started years — perhaps hundreds of years — before any concerted campaign was begun.
2. The reduction in death rate over long periods can be shown to have proceeded almost as rapidly in communities with no campaign as it has where the work has been intensive.

If the decrease in tuberculosis is not entirely due to our efforts what are the causes of a phenomenon so spectacular? Well, of course, we can give no specific answer. We may ask: Why have other infectious diseases also decreased in civilized countries: What accounts for the almost complete disappearance of plague, leprosy, small pox, typhoid fever, and many other killing diseases of 100 years ago? We can only say that for various reasons, which could be elaborated for hours, that the civilized world is becoming less and less congenial for pathogenic organisms and that civilized man is becoming more and more inhospitable as a host.

There is still something inscrutable about the way of all epidemics. It is not difficult to understand the waxing of a measles epidemic; but why does it wane? Why does it not go on till every



susceptible person in the community is infected? The same mystery surrounds the waning of tuberculosis. We can regard it as an epidemic disease, and since it is a disease that lasts a life time and not a few days as in acute fevers, its epidemics have a periodicity of hundreds of years and not of months. We can then regard our own day as being at the end of a great epidemic, the peak of which occurred perhaps two or three hundred years ago.

### Future Policy

Though candor forces us to admit that our efforts have not accounted for the steady reduction in death rate in the past few hundred years, common sense tells us we must go on with our campaign and even redouble our efforts, and for very good reasons. A hundred years ago tuberculosis was pandemic; everyone became infected by the time they reached maturity; resistance was built up by the selection of an enormous mortality; death rates gradually came down as in other epidemics. Now tuberculosis is endemic or sporadic. Eighty per cent. of our school children on the prairies escape contamination. Each succeeding generation is growing up less infected, less selected, and less resistant—all of which will set the stage for an epidemic outbreak. We are on an immunological hot spot from which we dare not retreat for fear of disaster. It is generally agreed that it is safer to have a positive tuberculin reaction if one is to live in an infected atmosphere; since we are bringing up the younger generation with negative tuberculin reactions we must provide a non-infected environment. The only way in which we can protect future generations is to eliminate or isolate the infection completely. The complete elimination of tuberculosis is the aim of present day anti-tuberculosis work. It is hoped that all people will be protected against contamination and go through life with negative skin reactions.

How can this be done? It cannot be done by waiting for infected people to develop symptoms that drive them to a doctor or signs that can be found with a stethoscope. Almost all the patients who have cough and expectoration have at least moderately advanced disease; almost all cases that have stethoscopic signs have already gone on to excavation. Waiting to discover tuberculosis by manifest signs and symptoms accounts for the fact that about 80% of all those admitted to Sanatoria are far advanced. This means that most are incurable and that they have already contaminated those with whom they have been living.

Further progress demands discovery of cases before they are ill and isolation of all open cases. Three things are necessary to accomplish this, namely:

1. Easily available diagnostic facilities.

2. Adequate bed space for treatment and segregation.

3. Full co-operation of the medical profession.

These necessities are gradually being acquired in Canadian Provinces and their effect is being felt. As evidence of results I submit an extract from a brief presented before the Royal Commission by Dr. G. J. Wherrett, Executive Secretary of the Canadian Tuberculosis Association.

"Alberta is the only province that is an exception to the general observation that deaths decline according to the extent to which treatment facilities are provided. Alberta is low in treatment beds and annual per capita expenditure and yet it has had a fair reduction in death rate. It must be borne in mind, however, that half-breeds who are a provincial responsibility are not included in this table and as Alberta has the greatest proportion of Indian deaths, 41.3 per cent. as against 26.5 per cent. in Saskatchewan, it should also have a greater proportion of half-breeds among whom the death rate has not declined to the same extent as in the white race. This table was calculated by the Vital Statistics Branch of the Dominion Bureau of Statistics and computed on the bases of exclusion of Indians and half-breeds because their registration of deaths was incomplete in the four-year period from 1922-1925.

### Comparison of Average Tuberculosis Mortality Rates by Provinces, 1922-25 and 1933-36

|                                    | Four-year tuberculosis death rate per 100,000 population |         |                     |
|------------------------------------|--|---------|---------------------|
|                                    | 1922-25  | 1933-36 | Percentage Decrease |
| Registration Area as of 1921 ..... | 65.4   | 40.6    | 37.9                |
| Prince Edward Island .....         | 119.6  | 78.5    | 29.0                |
| Nova Scotia .....                  | 123.9  | 90.2    | 27.2                |
| New Brunswick .....                | 106.4  | 76.2    | 28.4                |
| Ontario .....                      | 59.9   | 34.8    | 41.9                |
| Manitoba .....                     | 57.5   | 35.5    | 38.3                |
| Saskatchewan .....                 | 41.2   | 22.2    | 46.1                |
| Alberta .....                      | 43.2   | 25.4    | 41.2                |
| British Columbia .....             | 70.6   | 52.6    | 25.5                |

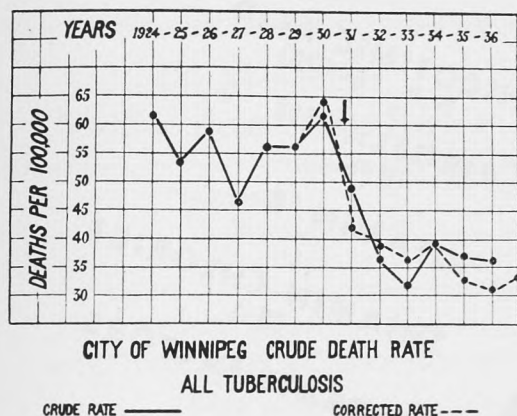
Figures for Quebec are not given because Quebec did not become part of the Registration Area until 1925."

Part of the reduction of death rate indicated above may be due to the unexplained general downward tendency of death rates. But there is very suggestive evidence that the reduction parallels the effort expended.

An even more striking proof of the good effect of applying the three principles set out above is provided by a study of the death rate in the City of Winnipeg in the past 15 years. (Graph No. III.)

A sudden fall in death rate will be seen to have taken place in 1931 and 1932 followed by a more

GRAPH No. III.



gradual downward trend since. This is more marked than indicated on the graph since the 1938 figure, which is not shown, is only 24.7. The average death rate of the seven years, 1924 to 1931 inclusive, is 55; the average of the seven years, 1932-1938, is 34—a reduction of 38%. This dramatic change corresponds to the provision of the first two necessities, i.e., the setting up of available diagnostic facilities in the opening of the Central Tuberculosis Clinic and the supply of adequate bed space in the building of St. Boniface Sanatorium.

With these new organizations the reduction in death rate should continue. With regard to the third necessity it can truly be said that anti-

tuberculosis agencies have always had the finest co-operation from the profession of Winnipeg. Possibly no group of practitioners in Canada appreciate their responsibility so fully and shoulder their obligation so cheerfully in this respect. As a consequence, Winnipeg is now one of the healthiest cities in Canada so far as tuberculosis is concerned.

The family practitioners are now in the position of being able to advance the fight against tuberculosis more than any other agency. They are the only members of the profession who have an opportunity of discovering early tuberculosis. The only adequate instruments in the early discovery of tuberculosis are the tuberculin syringe and x-ray equipment. Only by doing tuberculin tests on all contacts, and x-raying those that are positive, will any large percentage of curable cases be discovered. The only way in which further spread can be stopped is by forcing carriers into isolation just as though they had smallpox.

If anyone thinks that the half million dollars spent on tuberculosis in Manitoba is wasted, let him consider what would follow the abandonment of our present scheme. If all tuberculous people now in Sanatoria were discharged today about 500 centres of infection would be set up. The Provincial Schools and other public places would immediately become centres for dissemination. Thousands of our uninfected children would immediately become infected. A centre of infection today would cause ten times the havoc that it did 100 years ago when infection was universal. For these reasons I feel that a vigorous campaign against tuberculosis is more justified today than it ever has been and that any relaxation in vigilance might easily prove disastrous.

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## Special Articles and Association Notes

### The Manitoba Medical Association Review

*Formerly the Bulletin of the Manitoba Medical Association*

ESTABLISHED 1921

WINNIPEG, MAY, 1939

*Published Monthly by the*  
MANITOBA MEDICAL ASSOCIATION

*Editorial Office*  
102 MEDICAL ARTS BUILDING, WINNIPEG

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Annual Subscription - \$2.00

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### Visit of Their Majesties to Canada

The members of the medical profession join with all other citizens in welcoming to Canada His Majesty King George VI. and Queen Elizabeth. This is the first time that a reigning sovereign has visited one of the Dominions and the innovation has wide constitutional implications.

Their Majesties have both for long shown a special interest in health problems. His Majesty the King is patron of the Canadian Medical Association and also of the Canadian Society for the Control of Cancer. During their tour of Winnipeg they will visit the disabled soldiers at the Deer Lodge Military Hospital.

### Annual Meeting Manitoba Medical Association

#### Scientific Programme

Arrangements are already underway for the scientific programme for the Annual Meeting, September 11th, 12th and 13th. The Canadian Medical Association are arranging to send two clinicians, the President of the Canadian Medical Association and the Secretary. The names of the visiting speakers will be announced at an early date.

#### Scientific Exhibits

The Committee in charge of Scientific Exhibits for the Annual Meeting request that those who have material available and wish to arrange for its inclusion, should communicate with the Chairman before July 1st.

Correspondence may be sent to the Secretary of the Manitoba Medical Association, 102 Medical Arts Building, Winnipeg, and will be forwarded to the Committee.

### Winnipeg Medical Society

#### Annual Meeting

The Annual Meeting of the Winnipeg Medical Society will be held in the Physiology Lecture Theatre of the Medical College on Friday, May 19.

The presidential address by Dr. O. C. Trainor will be on Health Insurance.

### Brandon and District Medical Association

The Annual Meeting of the Brandon and District Medical Association will be held at the Prince Edward Hotel, Brandon, on May 5th at 7 p.m.

### Canadian Medical Association

The Annual Meeting of the Canadian Medical Association will be held in Montreal June 19th to 23rd. The headquarters will be at the Windsor Hotel.

The visiting speakers will include Professor E. P. Cathcart, Professor of Physiology at the University of Glasgow; Dr. A. J. Bedell of Albany, N.Y., U.S.A., an authority on ophthalmology; Dr. Clara M. Davis of Winetka, Ill., U.S.A., an expert on the modern feeding of infants, and Professor Norman Miller, Professor of Obstetrics and Gynaecology at the University of Michigan, U.S.A.

The entertainment committee have arranged an interesting programme, including a dance at the Normandie Roof of the Mount Royal Hotel, a golf tournament and banquet at the Royal Montreal Golf Club, and golf games at various courses throughout the week.

The ladies' committee have arranged special entertainment for the visiting ladies.

### American Congress of Obstetrics and Gynaecology

The American Committee on Maternal Welfare has sponsored a Congress on Obstetrics and Gynaecology to study the present day problems on Obstetrics and Gynaecology. The Congress will be held in Cleveland, Ohio, U.S.A., September 11th to 15th, 1939.

There will be sessions for each professional group with round table discussions and formal addresses.



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## Department of Health and Public Welfare

### NEWS ITEMS

The following is the second and final instalment of the article on "Focal Infection with Particular Emphasis on Preventive Aspects for Individuals Between 21 and 45 Years of Age" by W. J. Stainsby and Edith E. Nicholls.

#### THE INTESTINAL TRACT AS A FOCUS OF INFECTION

"The gastro-intestinal tract is frequently the site of chronic localized disease, and consideration must be given to it in any discussion of focal infections.

**"Peptic Ulcers.** Gastric and duodenal ulcers are frequently encountered in the age group under discussion. The etiology of these lesions is not known, and the infection usually found at the base and around such ulcers is probably of secondary importance. No definite evidence has yet been presented that they are caused by foci of infection or act as such for disease elsewhere in the body.

**"The Vermiform Appendix and Intestinal Diverticula.** These structures are at times the seat of chronic localized infections which may produce disease elsewhere in the body. The writers have seen a few cases of rheumatoid arthritis that were apparently caused by a chronically diseased appendix following the removal of which, the arthritis cleared up.

**"Lower Intestinal Ulcers.** Ulcers of the lower intestinal tract may be due to infectious agents, parasites, nutritional disturbances or to unknown causes. It seems quite likely that the infectious ulcers may act as a foci of infection, and for the prevention of disease elsewhere in the body serious consideration must be given to such lesions.

**"The Normal Intestinal Tract.** Almost all micro-organisms associated with the various foci of infection may be recovered from the feces of healthy individuals. Streptococci, especially of the viridans type, colon bacilli, either hemolytic or non-hemolytic, and various staphylococci should be considered as possible normal inhabitants of the lower intestinal tract. These organisms have been accused of passing through healthy intestinal mucosa and initiating various disease processes elsewhere in the body. No convincing evidence to support this view has as yet been published.

**"Constipation.** While constipation is a serious dysfunction of the intestinal tract, the frequency of this condition has been much overemphasized through extensive advertising by certain manufacturers of proprietary medications. Many individuals with normal health may have bowel movements at only two or three day intervals. Constipation has sometimes been accused of producing a condition of the bowel that would permit microorganisms or their toxic products to pass to other parts of the body and produce disease. While undoubtedly a toxic absorption due to constipation is capable of producing symptoms in the patient, there is no evidence that such absorption can produce disease in the accepted meaning of the term 'focal infection.'

**"Gall Bladder.** The gall bladder frequently becomes chronically infected with streptococci, colon bacilli, and staphylococci and acts as a focus of infection for disease elsewhere in the body. The relationship of chronic cholecystitis and subacute combined sclerosis has been mentioned by some writers.

#### RHEUMATOID ARTHRITIS AND FOCAL INFECTION

"Rheumatoid (atrophic, proliferative) arthritis has a definite relationship to foci of infection. While not definitely established, much evidence exists for the belief that the hemolytic streptococcus is the primary etiologic agent in a high percentage of cases of rheumatoid arthritis, and that other factors such as inherited predisposition, exposure to dampness and cold, overwork and worry, while important, play a secondary role in producing the disease. Therefore, it is essential in the prevention of rheumatoid arthritis that individuals be not permitted to harbor chronic foci infected with hemolytic streptococci. The tonsils and other lymphatic tissues of the naso-pharynx are frequently associated with such infections; the teeth and sinuses are next in importance and other foci of infection less commonly.

"In the treatment of well developed rheumatoid arthritis, removal or treatment of foci of infection constitutes one of the most important therapeutic procedures. A small proportion of such cases are completely relieved by the removal of such foci. This is particularly true in the very early cases, when the onset of the disease can be associated with an attack of tonsillitis or sinusitis or the development of an abscessed tooth. With a considerable number of cases of rheumatoid arthritis, particularly those moderately advanced, removal of foci of infection has to be supplemented with other forms of therapy in order to effect recovery. With the advanced cases, especially those that have considerable deformity with little further progression of the disease process, removal of primary foci of infection seldom modifies the course of the disease. It seems that once well developed pathological changes occur in the joints due to the arthritis, the joints themselves take on the aspects of a focus of infection and the removal of the primary focal infection is of little benefit to the patient.

#### GLOMERULONEPHRITIS AND FOCAL INFECTION

"While the etiology of glomerulonephritis remains obscure, the onset of the disease is almost always associated with a hemolytic streptococcus infection somewhere in the body. Diseases of the upper respiratory tract, particularly tonsillitis and peritonsillar abscesses, pharyngitis, sinusitis, the common cold, 'grippe' and scarlet fever, are generally responsible for initiating an attack of the disease. On the other hand, glomerulonephritis is very rare in countries where hemolytic streptococcus infections are uncommon.

"For the prevention of glomerulonephritis, therefore, focal infections that harbor the hemolytic streptococcus should be treated.

"When the glomerulonephritis has already developed, an existing sinusitis or mastoiditis should be treated without delay. If diseased tonsils are present, tonsillectomy should be delayed until after the subsidence of the acute nephritis symptoms. Tonsillectomy in such patients sometimes causes a recurrence of the glomerulonephritis, but the relapse is usually mild and of short duration.

#### RHEUMATIC FEVER AND FOCAL INFECTION

"A high percentage of initial attacks of rheumatic fever occurs in childhood. Nevertheless, a small proportion does develop in adult life, and as about 45 per cent. of all deaths from this disease occur after the age of 30, it should be included in the age group under discussion.

1. Opie, Eugene L. and Freund, Jules. An experimental study of protective inoculation with heat killed tubercle bacilli. Jour. Exper. Med. 66: 761 (December, 1937).

"Several investigators have clearly demonstrated that hemolytic streptococcus infections, particularly those of the upper respiratory tract, frequently precede or are associated with the onset of rheumatic fever. These workers have also shown that in countries where hemolytic streptococcus infections are uncommon rheumatic fever is rarely found.

"As a preventive measure for this disease, it is highly important that chronic foci of infection especially in the upper respiratory tract should be eradicated, as such localized inflammations tend to increase the frequency of respiratory disease which in turn may initiate the onset of rheumatic fever. The tonsils and sinuses are probably more important than other foci in this respect.

"When rheumatic fever is already developed, diseased tonsils should be removed and infected sinuses treated as soon as the patient's general condition permits it. Removal of such foci does not eliminate recurrences but inasmuch as such therapy lessens the frequency of upper respiratory infections, it likewise decreases the incidence of recurrences. It must be remembered in this regard that secondary etiologic factors, such as exposure to dampness and cold, malnutrition, unhygienic living conditions, play an important role in the development or recurrence of rheumatic fever.

#### NEURITIS AND FOCAL INFECTION

"A neuritis may involve one nerve, when it is known as mononeuritis or localized neuritis, or it may affect symmetrically distributed nerves when it is known as multiple or polyneuritis. The former variety may be caused by trauma, but both may be initiated by either chronic poisoning from alcohol or various chemicals, from lack of vitamins, or by infection such as the contagious diseases or focal infections. The foci of etiological importance in neuritis are generally located about the nose and throat, particularly the tonsils, teeth and sinuses. Spectacular results are sometimes obtained with these conditions by the removal of definitely infected foci of infection.

#### DISEASES OF THE RESPIRATORY TRACT AND FOCAL INFECTION

"**Asthma.** The part played by focal infections in the various types of asthma has not been clearly defined. There seems little doubt, however, that a certain small percentage of cases are primarily related to foci of infection, as patients with long-standing asthma have been known to obtain prompt and continued relief following the removal of an inflamed gall bladder, infected teeth, diseased tonsils, or the treatment of chronically diseased accessory nasal sinuses. Also, patients known to be suffering from pollen asthma and who are usually relieved with the onset of freezing weather sometimes continue to have asthmatic symptoms due to secondary infections in the bronchi or other parts of the upper respiratory tract.

"Focal infections, therefore, are of importance in the various types of asthma and their removal or treatment is indicated whenever they are found to be definitely diseased.

"**Bronchiectasis.** Bronchiectasis is a chronic progressive disease of the bronchi and bronchioles that is characterized by a dilatation of the tubes. It may be congenital or acquired. The latter type is produced by damage to the bronchial tissue or to mechanical factors either within or without the bronchus that produce a dilatation. Damage to the bronchial tissue is chiefly the result of bronchial infections. These infections occur during the course of various contagious diseases such as measles and whooping cough, from lobar and broncho-pneumonia, or from influenza. Another cause of bronchiectasis is bronchitis, either acute or chronic, that is produced by long standing focal infections of the upper respiratory tract,

particularly of the accessory nasal sinuses. Even when focal infections are not the primary etiological source of the bronchiectasis, they frequently are responsible for initiating or continuing the infection in these structures. It is very important therefore to eliminate, if possible, focal infections in the sinuses, teeth, and tonsils, in patients suffering from bronchiectasis.

#### VACCINES AND FOCAL INFECTION

"Vaccines have been used extensively for the past twenty years for the treatment of certain focal infections that are not subject to surgical removal and which do not respond well to other forms of treatment. A discussion of focal infection would, therefore, not be complete without consideration of vaccine therapy. Vaccines have been used particularly for chronic infections of the sinuses, other infections of the nasopharynx, otitis media, as well as for frequent attacks of upper respiratory infections. Vaccines for this purpose are of two types, the autogenous, made from cultures derived from the diseased structures of the patient to be treated, and stock vaccines, made from cultures of a variety of organisms that are usually associated with focal infections or upper respiratory diseases, such as *Staphylococcus aureus*, the hemolytic and green producing streptococci and certain types of pneumococci.

"Let us consider first of all the known evidence for vaccine therapy. Certain clinical evidence exists that autogenous and stock vaccines made from *Staphylococcus aureus*, from *Staphylococcus albus* or from *Staphylococcus citreus*, or from all three of these combined are of value prophylactically and therapeutically for carbuncles, furuncles and acne that are caused by these organisms. Certain clinical evidence also exists that both autogenous and stock vaccines of the acne bacillus have therapeutic value in the treatment of acne caused by this type of organism. It is well established and universally recognized that typhoid vaccine has definite prophylactic value for typhoid fever. Opie and Freund<sup>1</sup> quite recently have demonstrated that a vaccine can be made from tubercle bacilli which, when repeatedly injected into or below the skin of rabbits, increases their resistance against infection with virulent tubercle bacilli.

"With vaccine therapy thus established in a limited field, this form of therapy has been tried extensively for focal and upper respiratory infections.

"The use of autogenous vaccines for the treatment of chronic sinusitis, other chronic infections of the nasopharynx, bronchitis, and frequent upper respiratory infections, as well as non-gonococcal infections of the prostate and cervix, thus appears to be a rational procedure and worthy of serious trial. It presupposes that the infection itself is unable to produce sufficient immune bodies to effect a cure of the infectious process. While the procedure is logical, the results have been very disappointing. To date, no definite evidence has been produced that such vaccines aid in eradicating or preventing such infectious processes. The focal infections may be too isolated for the immune body fluids to affect the microorganisms and it may be that the types of organisms associated with these infections are too low in immunity-producing powers to produce an effective immunity in the body fluids or tissues. At any rate, autogenous vaccines for the above mentioned focal infections are very disappointing. It is hoped that some better way of preparing the vaccines or some better way of administration will eventually yield satisfactory results.

"The use of stock vaccines made from cultures of a variety of organisms for the prevention and treatment of focal infections is, in general, an irrational procedure. Without bacteriological examination of the infected lesion, there are too many pathogenic microorganisms or biological varieties of these microorganisms that may be of etiologic importance in



producing or maintaining the infectious process for one to hope to obtain satisfactory results from a 'shot-gun' vaccine. An exception to this is when a staphylococcus is the predominating organism associated with a localized infection, in which case a stock staphylococcus vaccine might be effective, although even here the likelihood of success would seem to be enhanced if an autogenous vaccine made with the predominating organisms were used."

## COMMUNICABLE DISEASES REPORTED

Urban and Rural - March, 1939

Occurring in the Municipalities of:

**Scarlet Fever:** Total 170—Brandon 42, Winnipeg 33, Boissevain 7, Virden 7, North Norfolk 6, Strathclair 6, Saskatchewan 4, Shoal Lake Village 3, Morris Town 2, Morton 2, St. Boniface 2, Unorganized 2, Whitewater 2, Assiniboia 1, Elton 1, Fort Garry 1, Gretna 1, Kildonan East 1, Kildonan West 1, Macdonald 1, Odanah 1, Rockwood 1, Roland 1, Ste. Rose Village 1, Wallace 1 (Late Reported: January, Winchester 5, Deloraine 2; February, Brandon 14, North Norfolk 9, Kildonan East 4, Daly 2, Portage Rural 2, Unorganized 2).

**Mumps:** Total 163—Winnipeg 123, Morris Town 16, Tuxedo 8, St. James 6, Kildonan East 2, Morris Rural 2, Wawanesa 2, St. Boniface 1 (Late Reported: February, Brandon 2, Morris Town 1).

**Influenza:** Total 91—Unorganized 46, Portage City 17, Winnipeg 12, Louise 7 (Late Reported: January, Brandon 3, Montcalm 1, Pilot Mound Village 1, St. Boniface 1, Whitehead 1; February, St. Clements 1, Teulon Village 1).

**Measles:** Total 67—Morden Town 41, Boissevain 8, Argyle 6, Louise 5, Winnipeg 4, Franklin 1 (Late Reported: February, Argyle 2).

**Chickenpox:** Total 65—Winnipeg 27, Minnedosa 12, Louise 6, Strathclair 4, Flin Flon 2, St. Boniface 2, Kildonan East 1, Montcalm 1, Morris Town 1, Ste. Anne 1 (Late Reported: February, St. Boniface 7, Minitonas 1).

**Smallpox:** Total 47—Boulton 13, Minitonas 7, Shellmouth 1, Swan River Town 1 (Late Reported: February, Swan River Rural 19, Minitonas 4, Hillsburg 1, Roblin Town 1).

**Whooping Cough:** Total 43—Winnipeg 27, St. James 7, Lawrence 4, Kildonan West 1, Minitonas 1, The Pas 1 (Late Reported: February, St. Boniface 2).

**Lobar Pneumonia:** Total 14—Brandon 3, Portage City 1 (Late Reported: January, Brandon 2, Lorne 2, Edward 1, Roblin Rural 1, St. Vital 1, Thompson 1, Transcona 1, Turtle Mountain 1).

**Erysipelas:** Total 12—Winnipeg 6, St. Boniface 2, Kildonan East 1, Kildonan West 1, Silver Creek 1 (Late Reported: January, St. James 1).

**Diphtheria:** Total 10—Winnipeg 2, Flin Flon 1, Franklin 1, Neepawa 1, Ste. Anne 1, St. Boniface 1, Unorganized 1 (Late Reported: February, Swan River Town 1, Tache 1).

**Tuberculosis:** Total 8—Winnipeg 8.

**German Measles:** Total 6—Brandon 5, Sifton 1.

**Typhoid Fever:** Total 4—De Salaberry 2, Ste. Anne 1 (Late Reported: January, Portage la Prairie City 1).

**Epidemic Encephalitis:** Total 1—(Late Reported: February, Pembina 1).

**Septic Sore Throat:** Total 1—Morris Town 1.

**Infective Dysentery:** Total 1—(Late Reported: January, McCreary 1).

**Veneral Disease:** Total 108—Gonorrhoea 57, Syphilis 51.

## DEATHS FROM ALL CAUSES IN MANITOBA

For the Month of February, 1939

**URBAN**—Cancer 40, Tuberculosis 13, Influenza 9, Lobar Pneumonia 7, Pneumonia (all forms) 6, Syphilis 2, Erysipelas 1, Tetanus 1, Malarial Fever 1, Septic Sore Throat 1, all others under one year 15, all other causes 136, Stillbirths 13. Total 245.

**RURAL**—Cancer 22, Pneumonia (all forms) 14, Tuberculosis 12, Influenza 9, Lobar Pneumonia 8, Puerperal Septicaemia 2, Infantile Paralysis 1, Lethargic Encephalitis 1, Syphilis 1, Whooping Cough 1, all others under one year 18, all other causes 130, Stillbirths 10. Total 229.

**INDIAN**—Tuberculosis 4, Pneumonia (all forms) 3, Influenza 1, all others under one year 5, all other causes 2, Stillbirths 1. Total 16.

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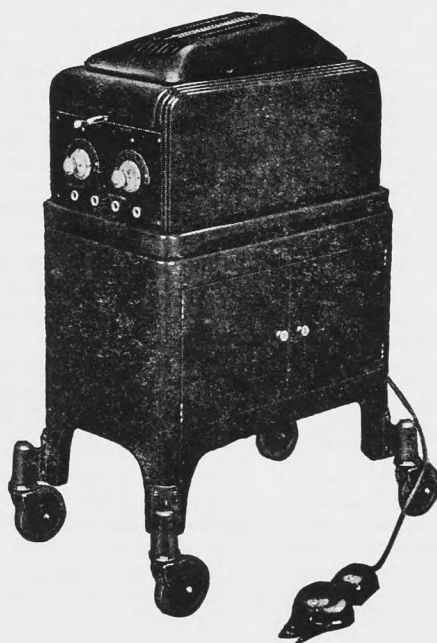
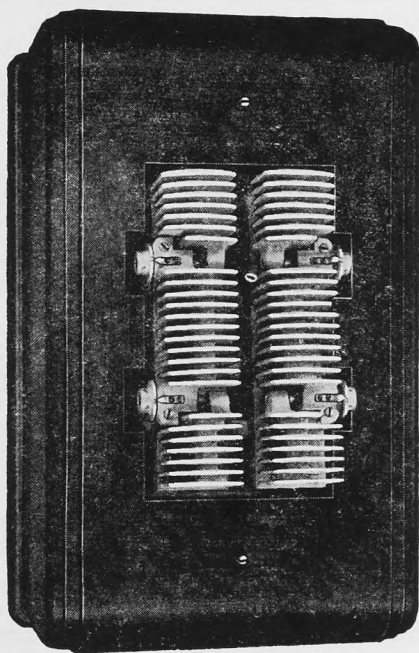
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